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EFFECT OF ORGANIC SOURCES OF NUTRIENTS ON GROWTH PARAMETERS AND SEED YIELD IN CHILLI CV.PKM 1

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ABSTRACT

Studies were undertaken at Department of Seed Science and Technology, Tamil Nadu Agricultural University, Coimbatore in chilli cv. PKM 1 with an objective to evaluate the effect of organic sources of nutrients on growth parameters and seed yield. Seeds bioprimed with liquid Azospirillum 15% for 6 h, and the control seeds were sown in protray nursery and were transplanted in the main field 35 days after sowing. Seeds bioprimed with Azospirillum 15% for 6 h performed better in growth and yield contributing factors when compared to control. Organic cultivation of seed crop revealed the superiority of inorganic treatments in terms of plant height, number of flowers plant^{-1}, number of fruits plant^{-1}, conversion efficiency, fruit yield and seed yield. Among the organic treatments, 100% vermicompost was best followed by 100% poultry manure for chilli seed production.

KEYWORDS: Biopriming, Chilli, Farmyard Manure, Vermicompost

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INTRODUCTION

Chilli (*Capsicum annuum*) belongs to the family solanaceae and is also called as hot pepper, cayenne pepper, sweet pepper *etc*. In India, only two species viz. *Capsicum annuum* and *Capsicum frutescens* are known. Chilli finds diverse utility as a spice, condiment, culinary supplement, medicine and vegetable. India is the largest producer, consumer and exporter of chilli. It is cultivated in an area of 7.92 lakh ha with annual production of 122.3 lakh MT with a productivity of 1.5 MT ha^{-1}.

Chilli crop responds well to the application of both organic manures and inorganic fertilizers. There is greater demand in the international market for organically produced chilli. Good quality farmyard manure (FYM) is perhaps the most valuable organic manure due to its micronutrient content, besides helping in the improvement of soil structure and water holding capacity of soil. Vermicompost has been recognized as one of the important organic manure because of its potential to supply nutrient and support beneficial microbes (Kale et al., 1992)

In organic farming systems, plants rely on healthy soil to get their nutrients. International Federation of Organic Agriculture Movement (IFOAM) has clearly laid down the condition that in order to get organic certification to the producer, the seed used for sowing should also have to be produced organically. Enormous scope exists in intensifying research on organic seed technology to meet international standards. Possibilities for exporting organically produced seed to other countries are also high. Our seed industry is poised to gain a lot in

this specialized area of seed production. As of now, in India, use of organic seed for raising crop is not mandatory, but considering the rapid growth in organic agriculture use of organic seed may become compulsory in the near future.

With these ideas in view, an experiment was conducted to evaluate the effect of organic sources of nutrients on chilli.

MATERIALS AND METHODS

Genetically pure seeds of chilli cv. PKM 1 obtained from the Horticultural College and Research Institute, Periyakulam, Tamil Nadu Agricultural University constituted the study material for the present investigation.

Bioprimed seeds as standardized by Dhanalakshmi (2013) *viz.*, *Azospirillum* at 15% concentration for 6 h were sown in protray filled with red soil and coir pith in the ratio of 1: 3. Thirty five days old chilli seedlings were transplanted in the main plot with the spacing of 60 × 45 cm. Recommended dose of fertilizer (60:60:30, kg NPK ha^{-1}) and farm yard manure, vermincompost, poultry manure alone and combinations based on nitrogen equivalent basis were applied in the respective plots as per the following treatment schedule (S_1-S_7).

TREATMENT DETAILS

Main Plot

- M_1 – Unprimed seed
- M_2 – Biopriming with liquid *Azospirillum* @ 15 % for 6 hr

Sub Plot

- S_1-Recommended dose of fertilizer (60:60:30 kg NPK ha^{-1})
- S_2 – 100% farm yard manure
- S_3 – 100% vermicompost
- S_4– 100% poultry manure
- S_5 - 50 % farm yard manure + 50 % poultry manure
- S_6 - 50 % farm yard manure + 50 % vermicompost
- S_7 - 50 % poultry manure + 50 % vermicompost
- **Season:** Kharif, 2012
- **Plot size:** 2.75 x 3.5 m
- **Spacing**: 60 × 45 cm
- **Replication:** Three
- **Design:** Split plot

Height of the plant was measured from the ground level to the tip of the growing plant in five plants in each plot at vegetative stage *i.e.,* 30 days after transplanting (DAT), flowering (60 DAT) and fruiting (90 DAT) stages and mean value was expressed in centimetre.

The total number of flowers in marked plants was counted and the mean values were expressed as number of flowers plant^{-1}. The number of fruits harvested in selected five plants was recorded and the mean value was expressed as number of fruits plant^{-1}.

The conversion of fruits from flowers was calculated by counting the number of flowers converted into fruits in randomly selected five plants in each plot.

Conversion efficiency = (Number of fruits per plant^{-1}/ Number of flowers plant^{-1})X 100

The fruits harvested in each picking, treatment wise and replication wise were pooled and expressed in kg. Fruit yield per hectare was computed based on fruit yield per plot and the mean value of fruit yield ha^{-1} expressed in kg.

The well ripened fruits from the randomly selected plants were harvested and dried, and kept in plastic bag. Seeds were extracted by beating the fruits with pliable sticks. Then, they were separated and sieved using BSS 8 × 8 sieve, weighed and expressed in g. Seed yield was calculated from the plot yield and expressed in kg ha^{-1}

RESULTS

Seeds bioprimed with *Azospirillum* 15% for 6 h performed better in seedling establishment and growth when compared to unprimed (control) seeds. Plant height is considered as an index of plant growth. Irrespective of main plot treatments plant height was maximum at 30, 60 and 90 DAT *viz*, 34.6 cm, 57.3 cm and 69.7 cm, respectively in recommended dose of fertilizer (60:60:30 kg NPK ha^{-1}) treatment followed by 100% vermicompost (32.2 cm, 55.3 cm and 69.1 cm, respectively) of sub plot treatments. Among the organic treatments, 100% vermicompost recorded the maximum plant height of 69.1 cm at 90 DAT (Table 1).

Irrespective of the main plot treatments, conversion efficiency was maximum (80.57%) in recommended dose of fertilizer (60:60:30 kg NPK ha^{-1}). Among the organic treatments, conversion efficiency (79.01%) was maximum in 100% vermicompost (Table 2).

Irrespective of main plot treatment fruit yield per hectare (2128 kg) was maximum in inorganic treatment (Table 3). Among the organic treatments, fruit yield per hectare (2097 kg) was maximum in 100% vermicompost followed by 100% poultry manure (2011 kg). In the present study, among the organic treatments, 100% vermicompost recorded higher seed yield of 196.1 kg ha^{-1} (Table 3).

DISCUSSIONS

It was observed that growth and plant height were higher in inorganic treatments. Inorganic treatment might have promoted the N uptake essential for efficient photosynthesis and faster growth rate resulting in increased plant height. This was in conformity with the earlier findings of Sundaralingam (2013) and Vijayan (2005) in hybrid rice. The increased plant height with 100% vermicompost might be due to availability of major and minor nutrients at all the essential stages of growth and development. Similarly, the application of organic manures showed a significant increase in plant height in chilli (Dileep, 2005). The earliness in flowering and percentage of fruit set might be due to the reason that immediate availability of nutrients to the plants from inorganic source and nutritional status of the plant. According to Edwards *et al*. (2004) vermicompost can have very good effects upon germination, growth, flowering, fruiting and yield of most of the crops, particularly fruits and vegetables. Higher fruit yield might be due to the fact that plants supplied with inorganic form of NPK have higher photosynthetic efficiency and better translocation of food assimilates from source to sink resulting in

increased yield of chilli as inferred by Pavitradev *et al*. (2012) and Dademol and Dongale (2004). The overall increase in vegetative and yield parameters was mainly due to the translocation of nutrients and assimilation of photosynthetic activities during the crop and growth stages. The best performance in terms of seed yield with the application of inorganic fertilizer might be due to the availability of optimum dose of nutrients to plant to complete and maintain its physiology (Kunzanglamo et al., 2012). Vermicompost acts as a chelating agent and regulates the availability of micronutrients to plants thereby resulting in increased growth and yield by providing nutrients in available form. Among the organic sources, vermicompost performed better than other organics. The results were in agreement with those of Beaulah (2001) and Somasundaram (2003).

CONCLUSIONS

Thus, in the present study it could be concluded that 100% vermicompost and 100% poultry manure are the best organic sources for chilli seed production, when compared to other sources of organic nutrients. Organic sources recorded higher fruit yield and seed yield eventhough plant height was higher for inorganic sources.

REFERENCES

1. *Beaulah, A. (2001). Growth and development of moringa (Moringa olifera Lam.) under organic and inorganic systems of culture. Ph.D. Thesis Tamil Nadu Agri. Uni. Coimbatore (India).*
2. *Dademol, A. A., & Dongale, J. H. (2004). Effect of manure and fertilizer on growth and yield of okra and nutrient availability in lateritic soil of Konkon. J Soil & Crops, 14(2), 278-283.*
3. *Dhanalakshmi, M. (2013). Standardisation of bioprimimg techniques in tomato cv. PKM. 1 and chilli cv. K2. M.Sc. (Ag.) Thesis, Tamil Nadu Agri. Uni. Coimbatore (India).*
4. *Dileep, S. N. (2005). Studies on effect of organic manures on the productivity and quality of chilli cv. K1. M.Sc. (Hort.) Thesis, Tamil Nadu Agri. Uni. Coimbatore (India).*
5. *Edwards, C. A., Dominguez, J., & Arancon, N. Q. (2004). The influence of vermicompost on plant growth and pest incidence. In: Zoology for sustainable development in the 21st century. (Shakil Hana.S.H and Mikhail W.Z.A eds.).*
6. *Kale, R. D., Mallesh, B. C., Bano, K., & Basvoraj, D. J. (1992). Influence of vermicompost application on the available micronutrient and selected microbial population in a paddy yield. Soil Biol Biochem 24: 1317-1320.*
7. *Kunzanglamo, Korla, B. N., & Shukla, Y. R. (2012). Effect of different organic and inorganic nutrient sources on seed production of Radish. Life Sciences Leaflets, 2, 38-44.*
8. *Pavitradev, Singh, I. P., Satyaprakash, Braj Mohan, Vinuj Kumar, & Manender Singh. (2012). Impact of integrated nutrient management on the yield performance of summer tomato (Lycopersicon esculentum Mill.) cv. Kanchan special. Int J Agric Sci, 8(1), 63-65.*
9. *Somasundaram, E. (2003). Evaluation of organic sources of nutrient and panchakavya spray on the growth and productivity of maize sunflower-greengram system. Ph.D. thesis Tamil Nadu Agri. Uni. Coimbatore (India).*
10. *Sundaralingam, K. (2005). Organic seed production in hybrid rice ADTRH1. Ph.D. Thesis Tamil Nadu Agri. Uni. Coimbatore (India).*
11. *Vijayan, R. (2005). Organic seed production in rice cv. ADT 43. Ph.D. Thesis Tamil Nadu Agri. Uni. Coimbatore (India).*

APPENDICES

Table 1: Effect of Biopriming of Seed and Source of Organic Manures on Plant Height (cm) at Different Stages of Plant Growth in Organic Seed Production in Chilli cv. PKM 1

Treatments	30DAT			60DAT			90DAT			Grand Mean
	M_1	M_2	Mean	M_1	M_2	Mean	M_1	M_2	Mean	
RDF	33.3	35.9	**34.6**	55.0	59.6	**57.3**	69.1	69.8	**69.5**	**53.80**
FarmYard Manure	23.4	26.6	**25.0**	42.2	45.4	**43.8**	58.5	60.9	**59.7**	**42.83**
Poultry Manure	29.4	32.1	**30.7**	52.3	53.0	**52.7**	67.4	68.1	**67.7**	**50.37**
Vermicompost	30.8	33.6	**32.2**	54.1	56.4	**55.3**	68.6	69.6	**69.1**	**52.20**
50%FYM+50%PM	26.4	29.8	**28.1**	49.0	50.5	**49.7**	64.9	66.7	**65.8**	**47.87**
50%FYM+50%VC	24.7	27.2	**26.0**	48.6	48.9	**48.7**	63.4	62.5	**63.0**	**45.90**
50%PM+50%VC	28.9	30.4	**29.6**	50.1	52.1	**51.1**	66.3	66.8	**66.5**	**49.07**
Mean	**28.1**	**30.8**		**50.2**	**52.3**		**65.4**	**66.3**		
	M	T	M x T	T x M	M	T	M x T	T x M	M	T	M x T	T x M
SEd	0.234	0.326	0.487	0.400	0.593	0.660	1.048	0.808	0.276	0.539	0.758	0.660
CD (P=0.05)	0.540	0.646	1.025	0.792	1.367	1.306	2.240	1.600	0.636	1.068	1.558	1.308

RDF-Recommended dose of fertilizer- 60:60:30 kg NPK ha^{-1}

M1- Unprimed seeds; M2 – Primed seeds

DAT- Days after transplanting

Table 2: Effect of Biopriming of Seed and Source of Organic Manures on Number of Flowers $Plant^{-1}$, Number of Fruits $Plant^{-1}$ and Conversion Efficiency (%) in Organic Seed Production in Chilli cv. PKM 1

Treatments	Number of Flowers per $Plant^{-1}$			Number of Fruits per $Plant^{-1}$			Conversion Efficiency (%)		
	M_1	M_2	Mean	M_1	M_2	Mean	M_1	M_2	Mean
RDF	44.90	49.50	**47.2**	35.80	40.30	**38.05**	79.73	81.41	**80.57**
FarmYard Manure	36.10	39.80	**38.0**	22.40	26.20	**24.30**	62.05	65.83	**63.94**
Poultry Manure	41.10	44.10	**42.6**	30.30	34.60	**32.45**	73.72	78.46	**76.09**
Vermicompost	42.30	45.00	**43.7**	33.00	36.00	**34.50**	78.01	80.00	**79.01**
50%FYM+50%PM	38.40	41.10	**39.8**	26.30	30.60	**28.45**	68.49	74.45	**71.47**
50%FYM+50%VC	33.90	38.80	**36.4**	23.00	29.00	**26.00**	67.85	74.74	**71.29**
50%PM+50%VC	37.20	42.00	**39.6**	25.00	31.70	**28.35**	67.20	75.48	**71.34**
Mean	**39.13**	**42.90**		**27.97**	**32.63**		**71.01**	**75.77**	
	M	T	M x T	T x M	M	T	M x T	T x M	M	T	M x T	T x M
SEd	0.853	0.522	1.093	0.639	0.259	0.512	0.718	0.627	0.293	1.003	1.346	1.228
CD (P=0.05)	1.966	1.033	2.433	1.265	0.597	1.013	1.476	1.241	0.676	1.986	2.704	2.432

RDF-Recommended dose of fertilizer- 60:60:30 kg NPK ha^{-1}

M1- Unprimed seeds; M2 – Primed seeds

Table 3: Effect of Priming of Seed and Source of Organic Manures on Fruit Yield ha^{-1} (kg) and Seed Yield ha^{-1} (kg) in Organic Seed Production in Chilli cv. PKM 1

Treatments	Fruit Yield ha^{-1}(kg)				Seed Yield ha^{-1}(kg)			
	M_1		M_2	Mean	M_1		M_2	Mean
RDF	2106		2150	**2128**	213.6		219.5	**216.5**
FarmYard Manure	1664		1752	**1708**	143.9		150.9	**147.4**
Poultry Manure	1968		2054	**2011**	185.0		191.5	**188.3**
Vermicompost	2070		2124	**2097**	184.5		207.6	**196.1**
50%FYM+50%PM	1924		1966	**1945**	167.5		167.7	**167.6**
50%FYM+50%VC	1874		1879	**1877**	153.6		161.9	**157.7**
50%PM+50%VC	1940		1929	**1934**	172.0		187.3	**179.6**
Mean	**1935**		**1979**		**174.3**		**183.8**	
	M	T	M x T	T x M	M	T	M x T	T x M
SEd	14.168	20.183	29.984	24.719	0.348	2.289	3.017	2.803
CD (P=0.05)	32.671	39.962	62.936	48.943	0.802	4.532	5.999	5.550

RDF-Recommended dose of fertilizer- 60:60:30 kg NPK ha-1

M1- Unprimed seeds; M2 – Primed seeds